November 2, 2001

04-SF,Ala-80-13.9/14.3,0.0/1.6
04-012024
ACIM-080-1(085)8N

Addendum No. 7

Dear Contractor:

This addendum is being issued to the contract for construction on State highway in THE CITY AND COUNTY OF SAN FRANCISCO AND ALAMEDA COUNTY IN SAN FRANCISCO AND OAKLAND FROM 1.3 km TO 3.3 km EAST OF THE YERBA BUENA ISLAND TUNNEL EAST PORTAL.

Submit bids for this work with the understanding and full consideration of this addendum. The revisions declared in this addendum are an essential part of the contract.

Bids for this work will be opened on December 19, 2001, instead of the original date of November 14, 2001.

This addendum is being issued to set a new bid opening date as shown herein, and revise the Project Plans, the Notice to Contractors and Special Provisions, and the Proposal and Contract.

Project Plan Sheets 10, 17, 24, 25, 27, 40, 42, 76, 103, 104, 415, 416, 417, 421 425, 785, 788, 791, 813, 830, 831, 832, 835, 917, 918, 919, 920, 921, 922, and 923 are revised. Half-sized copies of the revised sheets are attached for substitution for the like-numbered sheets.

Project Plan Sheets 109A, 109B, 109C, 875A, 916A, 916B and 916C are added. Half-sized copies of the added sheets are attached for addition to the project plans.

In the Special Provisions, Section 4, "BEGINNING OF WORK, TIME OF COMPLETION AND LIQUIDATED DAMAGES," **the second sentence of fifth paragraph is revised as follows:**

> "The Contractor shall not have exclusive right to use the marine access areas for the Contractor 04-012044 (Oakland Touchdown), as shown on the plans and shall evacuate all marine access areas after 410 working days beginning on the fifteenth calendar day after the approval of the contract."

In the Special Provisions, Section 5-1.25, "ENVIRONMENTAL WORK RESTRICTIONS," is revised as attached.

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In the Special Provisions, Section 5-1.28, "RELATIONS WITH REGIONAL WATER QUALITY CONTROL BOARD," the third paragraph is revised as follows:

"Attention is directed to Sections 7-1.11, "Preservation of Property," and 7-1.12, "Indemnification and Insurance," of the Standard Specifications."

In the Special Provisions, Section 5-1.31, "RELATIONS WITH SAN FRANCISCO BAY CONSERVATION DEVELOPMENT COMMISSION," the fifth paragraph is revised as follows:

"The Contractor shall submit to the Engineer a plan for in-Bay temporary falsework, temporary structures, trestles and other temporary in-Bay constructed facilities at least 45 days prior to the start of construction of such falsework, structures and facilities. The plan shall include the area and volume of material to place between the main-high-water-line and the mudline. The Engineer will submit to BCDC for plan review; the Engineer and BCDC will review the Engineer will provide comments to the Contractor within 30 days. The Contractor will have 15 days to revise and resubmit."

In the Special Provisions, Section 5-1.32, "RELATIONS WITH UNITED STATES COAST GUARD," is revised as attached.

In the Special Provisions, Section 10-1.01, "ORDER OF WORK," the third paragraph is revised as follows:

"As first order of work, the Contractor shall complete all work within the designated area, marine access areas, as shown on the plans, no later than 410 working days beginning fifteen days after the approval of the contract. The Contractor shall vacate all designated marine access areas and shall not interfere with Contract 04-012044, Oakland Touchdown Contractor’s access to these areas."

In the Special Provisions, Section 10-1.02, "WATER POLLUTION CONTROL," is replaced with Section 10-1.02, "WATER POLLUTION CONTROL (STORM WATER POLLUTION PREVENTION PLAN)," as attached.

In the Special Provisions, Section 10-1.09, "ENGINEER'S FIELD OFFICE," is replaced with the attached Section 10-1.09, "ENGINEER'S INSPECTION FACILITY."

In the Special Provisions, Section 10-1.22A, "TURBIDITY CONTROL," is added as attached.

In the Special Provisions, Section 10-1.23, "DREDGING," the fourth paragraph is replaced with the following paragraphs:

"Attention is directed to "Mobilization" of these special provisions for marine access. No dredging shall be allowed in the Contractor access area outside the limits of access dredging shown on the plans.

Attention is directed to “TURBIDITY CONTROL” of these special provisions for turbidity control requirements for all dredging, including dredging work within turbidity control zone, contiguous to the Environmentally Sensitive Area (ESA) shown on the plans.

Approval to dredge from December 1 to March 1 of any year during this period shall only be allowed as follows:

A. Dredging or disposal operation which was begun prior to December 1 of any year could not be completed by the December 1 deadline due to unforeseen delays;

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B. A biologist monitors for the presence of fish spawns at the project site during all dredging operations which occur between December 1 to March 1; and
C. All dredging will cease within eight hours of notification by the Engineer for a minimum of 14 calendar days or until the Engineer notifies the contractor that dredging may be resumed."

In the Special Provisions, Section 10-1.27, "CONCRETE STRUCTURES," subsection "COST REDUCTION INCENTIVE PROPOSALS FOR PRECAST CONCRETE SEGMENTS," is revised as attached.

In the Special Provisions, Section 10-1.29, "FURNISH PRECAST CONCRETE SEGMENT," is revised as attached.

In the Special Provisions, Section 10-1.30, "ERECT PRECAST CONCRETE SEGMENT," is revised as attached.

In the Special Provisions, Section 10-1.31, "JACK SUPERSTRUCTURE," subsection "GENERAL," the following paragraph is added after the third paragraph:

"The resultant of the jacking force shall be located at the center of gravity of the segment at closure and aligned with the centroidal axis of the box girder."

In the Proposal and Contract, the Engineer’s Estimate Items 69, 70 and 71 are revised.

To Proposal and Contract book holders:

Replace page 6 of the Engineer's Estimate in the Proposal with the attached revised page 6 of the Engineer's Estimate. The revised Engineer's Estimate is to be used in the bid.

Attached is a CD of the Information Handout for United States Army Corps of Engineers, San Francisco Bay Conservation Development Commission, San Francisco Bay Regional Water Quality Control Board and United States Coast Guard Permit Applications.

Indicate receipt of this addendum by filling in the number of this addendum in the space provided on the signature page of the proposal.

Submit bids in the Proposal and Contract book you now possess. Holders who have already mailed their book will be contacted to arrange for the return of their book.

Inform subcontractors and suppliers as necessary.

This office is sending this addendum by UPS overnight mail to Proposal and Contract book holders to ensure that each receives it.

If you are not a Proposal and Contract book holder, but request a book to bid on this project, you must comply with the requirements of this letter before submitting your bid.

Sincerely,

ORIGINAL SIGNED BY

REBECCA D. HARNAGEL, Chief
Office of Plans, Specifications & Estimates
Office Engineer

Attachments

5-1.25 ENVIRONMENTAL WORK RESTRICTIONS

The project is located within the jurisdictions of the U.S. Army Corp of Engineers (ACOE), the San Francisco Bay Conservation and Development Commission (BCDC), the California Department of Fish and Game, the San Francisco Bay Regional Water Control Board (RWQCB), the U.S. Fish and Wildlife Service and the National Marine Fisheries Service. The Department of Transportation has entered into an agreement regarding mitigation of the potential impact that this project.

The following documents are now available for review at the office of the Toll Bridge Duty Senior:

A. Final Environmental Impact Statement;
B. Bay Conservation and Development District permit Application;
C. San Francisco Bay Regional Water Quality Control Board Application for Water Quality Certification;
D. San Francisco Bay Regional Water Quality Control Board 401 Certification;
E. Army Corps of Engineers 404 Permit Application;
F. United States Coast Guard Permit Application; and
G. Caltrans letters to the Dredged Material Management Office with draft disposal plan.

Interested parties should contact the Toll Bridge Duty Senior by email at duty_senior_tollbridge_district04@dot.ca.gov or by phone at (510) 286-5549 at least 24 hours in advance to schedule an appointment to view these documents.

A CD with the ACOE, BCDC, RWQCB and the United States Coast Guard permit applications has been made part of the information handout that is available to the Contractor.

Attention is directed to the existence of environmental work restrictions that require special precautions be taken by the Contractor to protect the species listed below. It is the Contractor's responsibility to keep informed of all State and Federal Laws.

Attention is directed to the possibility that work operations will reveal paleontological resources. If the Contractor identifies such resources, the Engineer shall be notified and provided the find.

The Contractor shall comply with the California Endangered Species Act and the Federal Migratory Bird Treaty Act, which govern the protection of the American peregrine falcon, double-crested cormorant and western gull. Seabird colonies and nests which become established on new construction will be monitored by the Department and qualified seabird experts during the breeding season.

The Contractor shall notify the Engineer immediately if any dead or injured species of concern listed below are encountered.

The provisions in this section shall be made part of every subcontract executed pursuant to this contract.

The Contractor shall fully inform himself of the requirements of these agreements as well as all rules, regulations and conditions that may govern his operation in the following species of concern:

SPECIES OF CONCERN

PACIFIC HERRING, CHINOOK SALMON, STEELHEAD, LONGFIN SMELT AND GREEN STURGEON.--Open water hydraulic dredging in areas 6 meters below Mean Lower Low Water (NGVD1929) or shallower will not be allowed between January 1 through May 31 of any year, except in areas confined within cofferdams or pile casings. At the Contractor's option, dredging by clam shell method may be used to perform the work without any time restriction. Contractor’s operations within cofferdams or during pile installations which will not place debris into the water or increase water turbidity will not be restricted.

Surveys and monitoring of Pacific herring spawning locations will be conducted by the State and others. The Engineer will notify the Contractor whenever a spawning event is observed. If construction operations within the open water is within 200 meters of a spawn, the Contractor shall cease the portion of the contract work in this area within 8 hours of notification by the Engineer. Work shall not resume until notified by the Engineer which is expected to be approximately 14 calendar days from the time of spawning. It is anticipated that Pacific herring spawning could occur from November 15 through March 31 of any year.

AMERICAN PEREGRINE FALCON.--American peregrine falcon movements and behavior will be monitored by the U.S. Fish and Wildlife Service authorized personnel from the Santa Cruz Predatory Bird Research Group during construction between February 1st and July 31st of each year of construction. If American peregrine falcon nesting occurs on the Skyway structure, the Contractor shall provide access to the nesting site as directed by the authorized biologist to monitor the nest site and to remove the falcon eggs and chicks.

DOUBLE-CRESTED CORMORANT, WESTERN GULLS AND OTHER BIRD SPECIES.--Where Double-Crested Cormorant or other bird species nests are present on the Skyway structure, the Contractor shall not perform any activity within the nesting area during the breeding season defined as March 15 to August 31 of any year unless the Contractor implements the following:

A. Remove existing nests from the work areas prior to the breeding season.
B. Prevent the birds from completing nests in the work area by continually washing off nest material beginning March 1 through July 1.

Surveys and monitoring of the activities of the California Least Tern and California Brown Pelicans will be conducted by the State and others. The Contractor shall cooperate with the activities of the State monitors.

CALIFORNIA SEA LION, HARBOR SEAL AND GRAY WHALE.--Prior to conducting pile driving activities, a 500 meter safety zone will initially be established around the location that the pile is to be driven. Establishment and monitoring of the safety zone will be conducted by the State and others. The Contractor will notify the Engineer at least 30 minutes prior to the start of any pile driving.

Once pile driving begins, underwater sound pressure levels will be recorded at 500 meters. The radius of the safety zone will increase or decrease depending on measured underwater sound pressure levels. The outer radius of the safety zone will be the distance at which underwater sound pressure levels due to pile driving are below 190 dB re 1μPa RMS (impulse).

If a marine mammal is observed within the safety zone before the driving of a pile segment begins, the driving of the segment will be delayed until the marine mammal moves out of the safety zone. If a marine mammal enters the safety zone after the driving of a pile segment has commenced, the driving of the segment can proceed until it has reached the prescribed tip elevation.

Full compensation for conforming to the above requirements shall be considered as included in the contract prices paid for the various contract items of work and no additional compensation will be allowed therefore.

5-1.32 RELATIONS WITH UNITED STATES COAST GUARD

This project is located adjacent to and across a navigable channel which is under the jurisdiction of the United States Coast Guard (USCG), Eleventh District, Coast Guard Island, Alameda, California, 94501-5100.

A USCG Bridge Permit has been issued covering work to be performed under this contract. The Contractor shall be fully informed of all rules, regulations and conditions that may govern the Contractor's operations within the construction right-of-way and shall conduct the Contractor's work accordingly. The Brudge Permit shall be considered part of an integral part of the contract special provisions.

Copies of the Bridge Permit may be obtained at the Department of Transportation, Plans and Bid Documents, Room 200, Transportation Building, P.O. Box 942874, Sacramento, California 94274-0001, telephone number (916) 654-4490, and are available for inspection at the Toll Bridge Program Duty Senior at District 04 Office, 111 Grand Avenue, Oakland, California 94612, email duty_senior_tollbridge_district04@dot.ca.gov, telephone number (510) 286-5549.

Attention is directed to Sections 7-1.01, "Laws to be Observed," 7-1.11, "Preservation of Property," and 7-1.12, "Indemnification and Insurance," of the Standard Specifications.

The Contractor shall comply with all requirements of the U. S. Coast Guard with regard to the manner in which he conducts his operations and disposes of material. Any restriction of the channel and all navigation and warning lights shall be in accordance with regulations and subject to the approval of the U. S. Coast Guard. The Contractor's attention is directed to the following conditions which are among those established by the USCG in the work authorization for this project:

Navigation.--The Contractor's operations shall conform to the USCG regulations. Work shall be such that the free navigation of the waterway, navigable depths and channel widths are not impaired, except otherwise directed by the USCG.

A least 30 calendar days before anchoring barges or constructing trestles, falsework or temporarty towers within the construction right-of-way, or as directed by the Engineer, the Contractor shall notify the Engineer, in writing, along with drawings, of their proposed method for anchoring barges and of the location of trestles, falsework and temporary towers. The Engineer will transmit the Contractor's proposal to the USCG for approval. The Contractor shall not anchor any barges until their procedure has been approved by the USCG. In the event that the required USCG approval, in the opinion of the Engineer, delays the Contractor's operations, the Contractor will be granted a time extension commensurate with the delays.

Aids to Navigation.--The Contractor shall coordinate with the USCG Commander, Eleventh Coast Guard District, Building 50-6, Coast Guard Island, Alameda, California 94501-5100, Telephone (510) 437-2983 for written authorization at least 60 calendar days prior to any relocation or temporary removal of any aids to navigation within or near any areas involved with dredging or construction. In addition, the Contractor shall not obstruct, willfully damage, make fast to, or interfere with any aid to navigation.

Navigational Obstructions.--Any debris, material, plant or machinery that are incidentally dropped into the waters of the Bay during the progress of work, which may present a hazard or which may obstruct navigation shall be promptly recovered or removed. Floating objects shall be immediately recovered or tied down and marked, so that they do not present hazards to navigation. The Contractor shall give immediate notice of in-place obstructions to the proper authorities and shall mark or buoy such obstructions until they are removed. Should the Contractor neglect or delay compliance with the above requirements, such obstructions shall be removed by the State and the cost of such removal will be deducted from the moneys due to the Contractor or may be recovered from their bond.

Navigational Lighting.--The Contractor shall keep proper warning lights each night between the hours of sunset and sunrise upon all floating equipment, falsework connected with the work and all buoys which are of a size and location as to endanger or obstruct navigation. The Contractor shall provide suitable navigational lighting at any time that construction operations obstruct the waterways. All floating equipment shall be marked in accordance with USCG Regulations.

Falsework, Trestles and Temporary Towers.--Following the completion of construction, the Contractor shall removed all temporary falsework, trestles and towers. Piling shall be be cut off at least 1 meter below mudline, measured at the time of removal.

The Contractor shall be aware of the USCG facility on the southeast side of Yerba Buena Island. The Contractor's activities shall not interfere with the twenty-four hour a day operations at the USCG facility. The Contractor shall not restrict land or sea access to that facility.

Attention is directed to Section 8-1.06, "Time of Completion," of the Standard Specifications. Days during which the Contractor's operations are restricted in the navigation channel by others shall be considered to be nonworking days if, in the opinion of the Engineer, these restrictions cause a delay in the current controlling operation or operations.

Full compensation for conforming to the above requirements shall be considered as included in the contract prices paid for the various contract items of work and no additional compensation will be allowed therefor.

10-1.02 WATER POLLUTION CONTROL (STORM WATER POLLUTION PREVENTION PLAN)

Water pollution control work shall conform to the provisions in Section 7-1.01G, "Water Pollution," of the Standard Specifications and these special provisions.

This project lies within the boundaries of the San Francisco Bay Regional Water Quality Control Board and shall conform to the requirements of the National Pollutant Discharge Elimination System (NPDES) Permit for General Construction Activities No. CAS000002, Order No. 99-08-DWQ, including State Water Resources Control Board (SWRCB) Resolution No. 2001-046, and the NPDES Permit for the State of California Department of Transportation Properties, Facilities, and Activities, No. CAS000003, Order No. 99-06-DWQ issued by the SWRCB. These permits, hereafter referred to as the "Permits," regulate storm water discharges associated with construction activities.

Water pollution control work shall conform to the requirements in the "Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual" and the "Construction Site Best Management Practices (BMPs) Manual," and addenda thereto issued up to, and including, the date of advertisement of the project, hereafter referred to respectively as the "Preparation Manual" and the "Construction Site BMP Manual" and collectively as the "Manuals." In addition, water pollution control work shall conform to the requirements in the Sampling and Analysis Bulletin. Copies of the Manuals and the Permits may be obtained from the Department of Transportation, Material Operations Branch, Publication Distribution Unit, 1900 Royal Oaks Drive, Sacramento, California 95815, Telephone: (916) 445-3520. Copies of the Manuals and the Sampling and Analysis Bulletin may also be obtained from the Department's Internet Web Site at: http://www.dot.ca.gov/hq/construc/stormwater.html.

In addition, a Conceptual Storm Water Pollution Prevention Plan (CSWPPP) has been prepared for this project by the Department and is available for review at the office of the Toll Bridge Duty Senior at the District 4 Office, 111 Grand Avenue, Oakland, CA 94612, email; duty_senior_tollbridge_district04@dot.ca.gov, telephone number; (510) 286-5549, fax number; (510) 286-4563. This document may be used by the Contractor for developing the actual contract Storm Water Pollution Prevention Plan (SWPPP).

The Contractor shall know and fully comply with the applicable provisions of the Manuals, Permits, and Federal, State, and local regulations that govern the Contractor's operations and storm water discharges from both the project site and areas of disturbance outside the project limits during construction. The Contractor shall maintain copies of the Permits at the project site and shall make the Permits available during construction.

Unless arrangements for disturbance or use of areas outside the project limits are made by the Department and made part of the contract, it is expressly agreed that the Department assumes no responsibility for the Contractor or property owner with respect to any arrangements made between the Contractor and property owner. The Contractor shall implement, inspect and maintain all necessary water pollution control practices to satisfy all applicable Federal, State, and Local laws and regulations that govern water quality for areas used outside of the highway right-of-way or areas arranged for the specific use of the Contractor for this project. Installing, inspecting, and maintaining water pollution control practices on areas outside the highway right-of-way not specifically arranged for and provided for by the Department for the execution of this contract will not be paid for.

The Contractor shall be responsible for the costs and for liabilities imposed by law as a result of the Contractor's failure to comply with the provisions set forth in this section "Water Pollution Control (Storm Water Pollution Prevention Plan)", including but not limited to, compliance with the applicable provisions of the Manuals, Permits and Federal, State and local regulations. Costs and liabilities include, but are not limited to, fines, penalties, and damages whether assessed against the State or the Contractor, including those levied under the Federal Clean Water Act and the State Porter Cologne Water Quality Act.

In addition to the remedies authorized by law, money due the Contractor under the contract, in an amount determined by the Department, may be retained by the State of California until disposition has been made of the costs and liabilities.

When a regulatory agency or other third party identifies a failure to comply with the permit or any other local, State, or federal requirement, the Engineer may retain money due the Contractor, subject to the following:

A. The Department will give the Contractor 30 days notice of the Department's intention to retain funds from partial payments which may become due to the Contractor prior to acceptance of the contract. Retention of funds from payments made after acceptance of the contract may be made without prior notice to the Contractor.
B. No retention of additional amounts out of partial payments will be made if the amount to be retained does not exceed the amount being withheld from partial payments pursuant to Section 9-1.06, "Partial Payments," of the Standard Specifications.

C. If the Department has retained funds and it is subsequently determined that the State is not subject to the costs and liabilities in connection with the matter for which the retention was made, the Department shall be liable for interest on the amount retained for the period of the retention. The interest rate payable shall be 6 percent per annum.

Conformance with the provisions of this section "Water Pollution Control (Storm Water Pollution Prevention Plan)" shall not relieve the Contractor from the Contractor's responsibilities, as provided in Section 7, "Legal Relations and Responsibility," of the Standard Specifications.

The Contractor shall notify the Engineer immediately upon request from the regulatory agencies to enter, inspect, sample, monitor or otherwise access the project site or the Contractor's records pertaining to water pollution control work.

STORM WATER POLLUTION PREVENTION PLAN PREPARATION, APPROVAL AND AMENDMENTS

As part of the water pollution control work, a Storm Water Pollution Prevention Plan, hereafter referred to as the "SWPPP," is required for this contract. The SWPPP shall conform to the provisions in Section 7-1.01G, "Water Pollution," of the Standard Specifications, the requirements in the Manuals, the requirements of the Permits, and these special provisions. Upon the Engineer's approval of the SWPPP, the SWPPP shall be considered to fulfill the provisions in Section 7-1.01G, "Water Pollution," of the Standard Specifications for development and submittal of a Water Pollution Control Program.

No work having potential to cause water pollution, as determined by the Engineer, shall be performed until the SWPPP has been approved by the Engineer.

The Contractor shall designate a Water Pollution Control Manager. The Water Pollution Control Manager shall be responsible for the preparation of the SWPPP and any required modifications or amendments and shall be responsible for the implementation and adequate functioning of the various water pollution control practices employed. The Water Pollution Control Manager shall serve as the primary contact for all issues related to the SWPPP or its implementation. The Contractor shall submit to the Engineer a statement of qualifications, describing the training, previous work history and expertise of the individual selected by the Contractor to serve as Water Pollution Control Manager. The Engineer will reject the Contractor’s submission of a Water Pollution Control Manager if the submitted qualifications are deemed to be inadequate.

Within 21 working days after the approval of the contract, the Contractor shall submit 3 copies of the draft SWPPP to the Engineer. The Engineer will have 11 working days to review the SWPPP. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the SWPPP within 11 working days of receipt of the Engineer's comments. The Engineer will have 11 working days to review the revisions. Upon the Engineer's approval of the SWPPP, 4 approved copies of the SWPPP, incorporating the required changes, shall be submitted to the Engineer. In order to allow construction activities to proceed, the Engineer may conditionally approve the SWPPP while minor revisions are being completed. If the Engineer does not review or approve the SWPPP within the time specified, compensation will be made in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The SWPPP shall apply to all areas that are directly related to construction including, but not limited to, staging areas, storage yards, material borrow areas, and access roads within or outside of the highway right-of-way.

The SWPPP shall incorporate water pollution control practices in the following six categories:

A. Soil stabilization;
B. Sediment control;
C. Wind erosion control;
D. Tracking control;
E. Non-storm water control; and
F. Waste management and material pollution control.

The Contractor shall develop a Water Pollution Control Schedule that shall describe the timing of grading or other work activities that could affect water pollution. The Water Pollution Control Schedule shall be updated by the Contractor to reflect any changes in the Contractor's operations that would affect the necessary implementation of water pollution control practices.

The Contractor shall incorporate the "Minimum Requirements" presented in the Preparation Manual into the SWPPP. In addition to the "Minimum Requirements" presented in the Preparation Manual, the Contractor shall complete the BMP Consideration Checklist presented in the Preparation Manual. The Contractor shall identify and incorporate into the SWPPP the water pollution control practices selected by the Contractor or as directed by the Engineer.

In addition to the Minimum Requirements presented in the Preparation Manual, special requirements shall be incorporated into the SWPPP and the Water Pollution Control Cost Break-Down as follows:

Special Requirement(s)

Category	BMP, location and quantity
Tracking Control Practices	TC-1 Stabilized Construction Entrance/Exit; Various locations of site entry from roadways, 4 EA
Waste Management & Materials Pollution Control	WM-6 Hazardous Waste Management, Various, Lump Sum

The following contract items of work, shall be incorporated into the SWPPP as "Temporary Water Pollution Control Practices": Temporary Concrete Washout Facility and Temporary Fence (Type ESA). The Contractor's attention is directed to these special provisions provided for each temporary water pollution control practice.

The SWPPP shall include, but not be limited to, the items described in the Manuals, Permits, and related information contained in the contract documents.

The Contractor shall prepare an amendment to the SWPPP when there is a change in construction activities or operations which may affect the discharge of pollutants to surface waters, ground waters, municipal storm drain systems, or when the Contractor's activities or operations violate any condition of the Permits, or when directed by the Engineer. Amendments shall show additional water pollution control practices or revised operations, including those areas or operations not shown in the initially approved SWPPP. Amendments to the SWPPP shall be prepared, and submitted for review and approval in the same manner as specified for the SWPPP approval. Subsequent amendments shall be submitted within a time approved by the Engineer, but in no case longer than the time specified for the initial submittal and review of the SWPPP.

The Contractor shall keep one copy of the approved SWPPP and approved amendments at the project site. The SWPPP shall be made available upon request by a representative of the Regional Water Quality Control Board, State Water Resources Control Board, United States Environmental Protection Agency or of the local storm water management agency. Requests by the public shall be directed to the Engineer.

COST BREAK-DOWN

The Contractor shall submit to the Engineer a cost break-down for the contract lump sum item of water pollution control, together with the SWPPP.

The cost break-down shall be completed and furnished in the format shown in the cost break-down example included in this section. Unit descriptions and quantities shall be designated by the Contractor, except for the specified special requirements shown in the example. The units and quantities given in the example, if provided, are special requirements specified for the SWPPP, and shall be included in the cost break-down furnished to the Engineer. The Contractor shall verify the estimated quantities of the special requirements and submit revised quantities in the cost break-down.

The Contractor shall determine the quantities required to complete the work of water pollution control. The quantities and their values shall be included in the cost break-down submitted to the Engineer for approval. The Contractor shall be responsible for the accuracy of the quantities and values used in the cost break-down submitted for approval. The cost break-down shall not include water pollution control practices which are shown on the plans and for which there is a separate contract item.

The sum of the amounts for the work listed in the cost break-down table shall be equal to the contract lump sum price paid for water pollution control. Profit shall be included in each individual item listed in the cost break-down. The cost break-down shall be submitted and approved within the same time specified for the SWPPP. Partial payment for the water pollution control will not be made until the cost break-down is approved, in writing, by the Engineer. Attention is directed to "Overhead" of these special provisions.

Adjustments in the items of work and quantities listed in the approved cost break-down shall be made when required to address amendments to the SWPPP, except when the adjusted items are paid for as extra work.

No adjustment in compensation will be made to the contract lump sum price paid for water pollution control due to differences between the quantities shown in the approved cost break-down and the quantities required to complete the work as shown on the approved SWPPP. No adjustment in compensation will be made for ordered changes to correct SWPPP work resulting from the Contractor's own operations or from the Contractor's negligence.

The approved cost break-down will be used to determine partial payments during the progress of the work and as the basis for calculating the compensation for the item of water pollution control due to increases or decreases of quantities ordered by the Engineer. When an ordered change increases or decreases the quantities of an approved cost break-down item, the adjustment in compensation will be determined in the same manner specified for increases and decreases in the quantity of a contract item of work in conformance with the provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications. If an ordered change requires a new item which is not on the approved cost break-down, the adjustment in compensation will be determined in the same manner specified for extra work in conformance with Section 4-1.03D, "Extra Work," of the Standard Specifications.

If requested by the Contractor and approved by the Engineer, changes to the water pollution control practices listed in the approved cost break-down, including addition of new water pollution control practices, will be allowed. Changes shall be included in the approved amendment of the SWPPP. If the requested changes result in a net cost increase to the lump sum price for water pollution control, an adjustment in compensation will be made without change to the water pollution control item. The net cost increase to the water pollution control item will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

WATER POLLUTION CONTROL COST BREAK-DOWN

Contract No. 04-012024

UNIT DESCRIPTION	UNIT	APPROXIMATE QUANTITY	VALUE	AMOUNT
MINIMUM REQUIREMENTS				
SS-1 Scheduling	LS			
SS-2 Preservation of Existing Vegetation	LS			
SS-3 Hydraulic Mulch	M2			
SS-4 Hydroseeding	M2			
SS-5 Soil Binders	M2			
SS-6 Straw Mulch	M2			
SS-7 Geotextiles, Plastic Covers, and Erosion Control Blankets/Mats	M2			
SC-7 Street Sweeping and Vacuuming	LS			
SC-10 Storm Drain Inlet Protection	EA			
TC-2 Stabilized Construction Roadway	M2			
WE-1 Wind Erosion Control	LS			
NS-6 Illicit Connection/Illegal Discharge Detection And Reporting	LS			
NS-8 Vehicle and Equipment Cleaning	LS			
NS-9 Vehicle and Equipment Fueling	LS			
NS-10 Vehicle and Equipment Maintenance	LS			
WM-1 Material Delivery and Storage	LS			
WM-2 Material Use	LS			
WM-4 Spill Prevention and Control	LS			
WM-5 Solid Waste Management	LS			
WM-9 Sanitary/Septic Waste Management	LS			
SPECIAL REQUIREMENTS				
TC-1 Stabilized Construction Entrance/Exit	EA	4		
WM-6 Hazardous Waste Management	LS	Lump Sum		

TOTAL _____

SWPPP IMPLEMENTATION

Upon approval of the SWPPP, the Contractor shall be responsible throughout the duration of the project for installing, constructing, inspecting, maintaining, removing, and disposing of the water pollution control practices specified in the SWPPP and in the amendments. Unless otherwise directed by the Engineer, the Contractor's responsibility for SWPPP implementation shall continue throughout any temporary suspension of work ordered in conformance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications. Requirements for installation, construction, inspection, maintenance, removal, and disposal of water pollution control practices are specified in the Manuals and these special provisions.

If the Contractor or the Engineer identifies a deficiency in any aspect of the implementation of the approved SWPPP or amendments, the deficiency shall be corrected immediately. The deficiency may be corrected at a later date and time if requested by the Contractor and approved by the Engineer in writing, but not later than the onset of precipitation. If the Contractor fails to correct the identified deficiency by the date agreed or prior to the onset of precipitation the project shall be in noncompliance. Attention is directed to Section 5-1.01, "Authority of the Engineer," of the Standard Specifications and the payment sections of these special provisions for possible noncompliance penalties.

If the Contractor fails to conform to the provisions of "Water Pollution Control (Storm Water Pollution Prevention Plan)," the Engineer may order the suspension of construction operations which create water pollution.

Implementation of water pollution control practices may vary by season. The Construction Site BMP Manual and these special provisions shall be followed for control practice selection of year round, rainy season and non-rainy season water pollution control practices.

Year-Round Implementation Requirements

The Contractor shall have a year-round program for implementing, inspecting and maintaining water pollution control practices for wind erosion control, tracking control, non-storm water control, and waste management and materials pollution control.

The National Weather Service weather forecast shall be monitored and used by the Contractor on a daily basis. An alternative weather forecast proposed by the Contractor may be used if approved by the Engineer. If precipitation is predicted, the necessary water pollution control practices shall be deployed prior to the onset of the precipitation.

Disturbed soil areas shall be considered active whenever the soils disturbing activities have occurred, continue to occur or will occur during the ensuing 21 days. Non-active areas shall be protected as prescribed in the Construction Site BMP Manual within 14 days of cessation of soil disturbing activities or prior to the onset of precipitation, whichever occurs first.

Rainy Season Requirements

Soil stabilization and sediment control practices conforming to the requirements in the Special Requirements and applicable Preparation Manual Minimum Requirements, shall be provided throughout the rainy season, defined as between October 15 and April 15.

An implementation schedule of required soil stabilization and sediment control practices for disturbed soil areas shall be completed no later than 20 days prior to the beginning of each rainy season. The implementation schedule shall identify the soil stabilization and sediment control practices and the dates when the implementation will be 25 percent, 50 percent, and 100 percent complete, respectively. Construction activities beginning during the rainy season shall implement applicable soil stabilization and sediment control practices.

Throughout the defined rainy season, the active disturbed soil area of the project site shall be not more than 2 hectares. The Engineer may approve, on a case-by-case basis, expansions of the active disturbed soil area limit. Soil stabilization and sediment control materials shall be maintained on site sufficient to protect the unprotected disturbed soil area. A detailed plan for the mobilization of sufficient labor and equipment shall be maintained to deploy the water pollution control practices required to protect the project site prior to the onset of precipitation events.

Non-Rainy Season Requirements

The non-rainy season shall be defined as all days outside the defined rainy season. The Contractor’s attention is directed to the Construction Site BMP Manual for soil stabilization and sediment control implementation requirements on disturbed soil areas during the non-rainy season. Disturbed soil areas within the project shall be protected in conformance with the requirements in the Construction Site BMP Manual with an effective combination of soil stabilization and sediment control.

MAINTENANCE

To ensure the proper implementation and functioning of water pollution control practices, the Contractor shall regularly inspect and maintain the construction site for the water pollution control practices identified in the SWPPP. The construction site shall be inspected by the Contractor as follows:

A. Prior to a forecast storm;
B. After a precipitation event which causes site runoff;
C. At 24 hour intervals during extended precipitation events;
D. Routinely, a minimum of once every 10 working days outside of the defined rainy season;
E. Routinely, a minimum of 5 working days during the defined rainy season.

The Contractor shall use the Storm Water Quality Construction Site Inspection Checklist provided in the CSWPPP or an alternative inspection checklist provided by the Engineer. One copy of each site inspection record shall be submitted to the Engineer within 24 hours of completing the inspection.

REPORTING REQUIREMENTS

Report of Discharges, Notices or Orders

If the Contractor identifies any discharge into receiving waters in a manner causing, or potentially causing, a condition of pollution, or if the project receives a written notice or order from any regulatory agency, the Contractor shall immediately inform the Engineer. The Contractor shall submit a written report to the Engineer within 5 working days of the discharge event, notice, or order. The report shall include the following information:

A. The date, time, location, nature of the operation, and type of discharge, including the cause or nature of the notice or order.
B. The water pollution control practices deployed before the discharge event, or prior to receiving the notice or order.
C. The date of deployment and type of water pollution control practices deployed after the discharge event, or after receiving the notice, or order, including additional measures installed or planned to reduce or prevent reoccurrence.
D. An implementation and maintenance schedule for any affected water pollution control practices.

Report of First-Time Non-Storm Water Discharge

The Contractor shall notify the Engineer at least 3 working days in advance of each first-time non-storm water discharge event, excluding exempted discharges. The Contractor shall notify the Engineer of each different operation causing a non-storm water discharge and shall obtain field approval for each first-time non-storm water discharge. Non-storm water discharges shall be monitored at each first-time occurrence and routinely thereafter.

Annual Certifications

By June 15 of each year, the Contractor shall complete and submit an Annual Construction Activity Certification as contained in the Preparation Manual to the Engineer.

PAYMENT

The contract lump sum price paid for prepare storm water pollution prevention plan shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals for doing all the work involved in developing, preparing, obtaining approval of, revising, and amending the SWPPP, including the sampling and analysis plan, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Attention is directed to Section 9-1.06, "Partial Payments," and Section 9-1.07, "Payment After Acceptance," of the Standard Specifications. Payments for prepare storm water pollution prevention plan will be made as follows:

A. After the SWPPP has been approved by the Engineer, 75 percent of the contract item price for prepare storm water pollution prevention plan will be included in the monthly partial payment estimate; and
B. After acceptance of the contract in conformance with the provisions in Section 7-1.17, "Acceptance of Contract," of the Standard Specifications, payment for the remaining 25 percent of the contract item price for prepare storm water pollution prevention plan will be made in conformance with the provisions in Section 9-1.07.

The contract lump sum price paid for water pollution control shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing, constructing, removing, and disposing of water pollution control practices, including non-storm water and waste management and materials pollution water pollution control practices, except those shown on the plans and for which there is a contract item of work, and except developing, preparing, obtaining approval of, revising, and amending the SWPPP, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Storm water sampling and analysis will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

The cost of maintaining the temporary water pollution control practices shall be divided equally by the State and the Contractor as follows:

Soil Stabilization

All temporary water pollution control practices except:
SS-1 Scheduling
SS-2 Preservation of Existing Vegetation

Sediment Control

All temporary water pollution control practices.

Tracking Control

All temporary water pollution control practices except:
SC-7 Street Sweeping and Vacuuming

Wind Erosion Control

All temporary water pollution control practices.

Non-Storm Water Control

No sharing of maintenance costs will be allowed.

Waste Management & Material Control

No sharing of maintenance costs will be allowed.

The division of cost will be made by determining the cost of maintaining temporary water pollution control practices in conformance with the provisions in Section 9-1.03, "Force Account Payment," of the Standard Specifications and paying to the Contractor one-half of that cost. Clean-up, repair, removal, disposal, improper installation, and replacement of temporary water pollution control practices damaged by the Contractor's negligence shall not be considered as included in the cost for performing maintenance.

The provisions for sharing maintenance costs shall not relieve the Contractor from the responsibility for providing appropriate maintenance on items with no shared maintenance costs.

Full compensation for non-shared maintenance costs of water pollution control practices, as specified in these special provisions, shall be considered as included in the contract lump sum price paid for water pollution control and no additional compensation will be allowed therefor.

Water pollution control practices which are shown on the plans and for which there is a contract item of work will be measured and paid for as that contract item of work.

The Engineer will retain an amount equal to 25 percent of the estimated value of the contract work performed during periods in which the Contractor fails to conform to the provisions in this section "Water Pollution Control (Storm Water Pollution Prevention Plan)," as determined by the Engineer.

Retention for failure to conform to the provisions in this section "Water Pollution Control (Storm Water Pollution Prevention Plan)" shall be in addition to the other retention amounts required for the contract. The amounts retained for the Contractor's failure to conform to provisions in this section will be released for payment on the next monthly estimate for partial payment following the date when an approved SWPPP has been implemented and maintained, and when water pollution has been adequately controlled, as determined by the Engineer.

10-1.09 ENGINEER'S INSPECTION FACILITY

Pursuant to Section 5-1.08, "Inspection" of the Standard Specifications, the Contractor shall provide two Engineer's inspection facilities for the sole use of the Engineer and his representative. The first inspection facility shall have at least 18.5 square meters of floor space and shall be located on a barge within the Caltran's right of way, as directed by the Engineer. The second inspection facility shall have at least 75 square meters of floor space and shall be a staging facility in close proximity of the pier where the Engineer's crew boat will be moored. An additional 250 square meters shall be provided adjacent to the second inspection facility for the sole purpose of parking for State owned vehicles.

Both inspection facilities shall have windows, doors with locks, heating, air-conditioning, electric lighting, communication hookups, and sanitary facilities. If the Engineer's office is to be located in the same building as the Contractor's Superintendent's office, it shall be partitioned off and provided with a separate entrance.

Equipment to be furnished shall be of standard quality and new, or like new in appearance and function.

The Contractor shall provide, maintain, and subsequently remove as his property, the Engineer's inspection facilities as specified herein, for the free and exclusive use of the Engineer and his representatives. The Engineer's inspection facilities, equipped as specified, shall be available at the site for the Engineer's use prior to the start of any field work under this contract. The Contractor shall make all necessary arrangements for locating the Engineer's inspection facilities at a Port of Oakland site where marine access will be provided to the construction site. Sanitary facilities shall be provided which complies with State and local regulations.

The contract lump sum price paid for Engineer's field office shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals for doing all work involved in providing the Engineer inspection facilities, complete and in place, including maintaining and removing the temporary inspection facilities, and supplying and paying for electricity, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.22A TURBIDITY CONTROL

Turbidity control work shall conform to the Standard Specifications, the plans, these special provisions, and with all regulatory permits and waste discharge requirements pertaining to any work that has the potential to cause turbidity within the project limits. Turbidity control work shall consist of implementing control measures to limit transport of disturbed sediment into environmentally sensitive areas (ESA). Except as specified in the Standard Specifications and these special provisions, compliance monitoring for turbidity will be performed by the Engineer in conformance with regulatory permits, waste discharge requirements and a turbidity monitoring program developed by the Department.

Attention is directed to "Environmentally Sensitive Areas (General)" of these special provisions.

Turbidity is defined as the condition that prevails when sediment and debris are suspended in water, resulting in diminished water clarity. Turbidity shall be measured using an optical backscatter meter providing a minimum of 30-second weighted average turbidity reading in mg/liter or nephelometric turbidity units (NTU).

40 working days prior to beginning work in marine environments, the Contractor shall submit, for review and approval by the Engineer, a Turbidity Control Plan for all work that has the potential to cause turbidity. The Contractor shall allow 10 working days for the Engineer to review and approve the plan. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the plan within 10 working days of receipt of the Engineer's comments and shall allow 5 working days for the Engineer to review and approve the revisions. The Turbidity Control Plan shall describe equipment used to do the dredging work, operation schedule, deployment of turbidity control measures and containment contingency. Plans and working drawings shall be submitted in accordance with Working Drawings" of these special provisions. Three copies of the plan shall be furnished to the Engineer initially with equal copies furnished following subsequent revisions and updating. Final approval of the plan will be subject to field testing. The Contractor shall demonstrate that the proposed turbidity control measures work as intended under actual working and field conditions.

All work that has the potential to cause turbidity within 100 meters of the ESA boundary as shown on the plans shall have turbidity control measures implemented to conform with regulatory permits and to protect the ESA. The following control measures, as a minimum, shall be installed and maintained within this 100 meter zone:

A. Install engineered silt curtains;
B. Limiting marine activity and perform dredging work during the period from low to high tide; and
C. Implement the use of dredging equipment (e.g. watertight clamshell, decant scow, etc.) and perform dredging work in a manner that causes the least amount turbidity.

In addition, if the control measures fail to adequately control turbidity in accordance with regulatory permits, the following additional control measures shall be implemented in conjunction with those listed above to enhance turbidity control:

A. Modifying construction practices to minimize sediment disturbance and drift;
B. Modifying size and type of marine equipment employed; and
C. Conducting work during night periods.

The low to high tide time period shall be in accordance with the time period and tidal fluctuation outlined in the National Oceanic Atmospheric Administration (NOAA) Tide Station at Yerba Buena Island.

All removed control measures shall be disposed of in accordance with section 7-1.13, "Disposal of Material Outside the Highway right of Way" of the Standard Specifications.

MEASUREMENT AND PAYMENT

The contract lump sum price paid for Turbidity Control shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in turbidity control complete in place, including development and submittal of the turbidity control plan and removal and disposal of all measures when no longer necessary, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

COST REDUCTION INCENTIVE PROPOSALS FOR PRECAST CONCRETE SEGMENTS

Except as provided herein, precast concrete segments shall be constructed in conformance with the details shown on the plans, the provisions in Sections 50, "Prestressing Concrete," and Section 51, "Concrete Structures," of the Standard Specifications, and in Sections “Furnish Precast Concrete Segment,” and “Erect Precast Concrete Segment,” elsewhere in these special provisions.

If the Contractor submits cost reduction incentive proposals for precast concrete segments, the proposals shall be in accordance with the provisions of Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications, the provisions in “Cost Reduction Incentive Proposals” elsewhere in these special provisions, and these special provisions.

The Engineer may reject any proposal which, in the Engineer's judgment, may not produce a structure which is at least equivalent to the planned structure.

The preliminary concept of the proposed CRIP for precast concrete segments shall include:

A. A detailed description of the construction method or proposed change, with conceptual drawings and preliminary design calculations.
B. Itemization of redesigns necessary to accommodate the change or method in accordance with the project specific design criteria and these special provisions.
C. A construction schedule showing completion of the project within the required number of working days.
D. Evidence of the Contractor’s experience using the method, if applicable.
E. An estimate of the net construction cost savings.

The Contractor shall submit 10 copies of the preliminary concept of the proposed CRIP for precast concrete segments to the Engineer, and shall allow 20 working days after the meeting for the Engineer to review each conceptual submittal.

Each CRIP shall be submitted prior to completion of 25 percent of the contract working days and sufficiently in advance of the start of the work that is proposed to be revised by the CRIP to allow time for review by the Engineer and correction by the Contractor of the CRIP plans and calculations without delaying the work. The Contractor shall allow a minimum of 60 working days for the review of a CRIP. In the event that several CRIPs are submitted simultaneously, or an additional CRIP is submitted for review before the review of a previously submitted CRIP has been completed, the Contractor shall designate the sequence in which the CRIPs are to be reviewed. In this event, the time to be provided for the review of any proposal in the sequence shall be not less than the review time specified herein for that proposal, plus 2 weeks for each CRIP of higher priority which is still under review.

Permits and approvals required of the State have been obtained for the structures shown on the plans. Proposals which result in a deviation in configuration may require new permits or approvals. The Contractor shall be responsible for obtaining the new permits and approvals before the Engineer will reach a decision on the proposal. Delays in obtaining permits and approvals will not be reason for granting an extension of contract time.

All proposed modifications shall be designed in conformance with the bridge design specifications, procedures currently employed by the Department, and the project design criteria. The project design criteria are included in the “Information Handout” available to the Contractor as provided for in Section 2-1.03, “Examination of Plans, Specifications, Contract, and Site of Work,” of the Standard Specifications. The proposal shall include all related, dependent or incidental changes to the structure and other work affected by the proposal. The proposal will be considered only when all aspects of the design changes are included for the entire structure. Changes, such as additional reinforcement and changes in location of reinforcement, necessary to implement the CRIP after approval by the Engineer, shall be made at the Contractor's expense.

CRIP submittals shall conform to "Working Drawings," elsewhere in these special provisions.

No modifications will be permitted in for the following:

A. Thickness of the box girder webs;
B. Thickness of the deck slabs;
C. Thickness of the bottom slabs;
D. The span lengths;
E. The deck profile;
F. The exterior dimensions of the box girder; and
G. Fixed connection details at the tops and bottoms of the piers.

CRIPs may be proposed for the following:

A. Segment lengths;
B. The quantity, size, and location of reinforcing steel;
C. The quantity, size, and stressing force and location of prestressing steel;
D. Segment lifting and erection methods; and
E. Construction sequence as defined by plan sheets “Construction Sequence A,” “Construction Sequence B,” and “Construction Sequence C”.

CRIPs shall conform to the following requirements:

A. All permanent post-tensioning anchorage systems shall be located within the deck slab, within the girder webs, within reinforced stressing blocks, or within diaphragms. Temporary post-tensioning anchorages shall be located within the deck slabs, in diaphragms or reinforced stressing blocks inside the box. Temporary external post-tensioning anchorage systems may be located outside the box girders and removed to restore the girder to the original cross section after use.
B. Abutting surfaces of match cast segments shall have multiple shear keys.
C. The proposed post-tensioning tendon profile shall be compatible with the minimum bending radius as shown on the plans. The Contractor’s design friction and wobble coefficients shall not exceed the coefficients as shown on the plans.
D. Modifications proposed to the minimum amount of prestressing force that must be provided by full length draped tendons are subject to the provisions in “Prestressing Concrete” of these special provisions.

In addition, CRIPs shall conform to the following analysis and design requirements:

A. The Contractor shall submit the analysis results that are computed from a time-dependent segmental analysis software program. These results shall be combined with all other required load cases as defined in the project design criteria. The reported resultant stresses shall conform to the requirements as specified in the project design criteria.
B. The Contractor shall submit design calculations for construction procedures, as required in Section 10.2 of Division II Construction Specifications of the AASHTO Guide Specifications.
C. The Contractor shall submit complete superstructure and pier design calculations in conformance with the Department's Bridge Design Specifications, the procedures currently employed by the State, and the project design criteria. The Contractor may obtain, in writing, from the Engineer the superstructure and substructure live load, temperature, wind, longitudinal force from live load, centrifugal force and seismic forces. The calculations submitted by the Contractor shall also include the following:

    1. Camber calculations including camber diagrams, casting curves, final profile grades, and erection elevations in accordance with the Contractor’s chosen construction method, sequence, and schedule.
    2. Calculations showing that the pier concrete stresses due to unbalanced cantilever loading do not exceed allowable stresses shown in Table 7-2, “Allowable Tensile Stresses for Construction Load Combinations” of the AASHTO Guide Specifications for Segmental concrete Bridges, 2nd Edition, 1999.
    3. Calculations showing that pier force demands satisfy the following equation: $M2/Mn2+M3/Mn3 \leq 0.7$

       where M2 and M3 are factored moments about the longitudinal and transverse axes of the pier based on Table 2.8.1B in the project design criteria, and Mn2 and Mn3 are the longitudinal and transverse nominal flexural capacities of the pier based on a concrete strain of 0.003.
    4. Calculations including the effects of construction sequence and history as well as the effects of temporary construction loads.

D. Stresses for each segment shall also be calculated and reported for the following intermediate construction stages:

1. Immediately after erecting or placing concrete in each segment;
2. Immediately after stressing cantilever tendons;
3. Immediately prior to, and after jacking operations at closure;
4. Immediately prior to, and after, placement of closure concrete;
5. Immediately prior to, and after, stressing of the first stage post-tensioning through the closure prior to release of the closure formwork;
6. Immediately after the release of the closure formwork;
7. Following completion of span post tensioning tendons;
8. Following completion of continuity post-tensioning tendons;
9. Prior to and after all steps of hinge construction; and
10. Prior to and after removal of all temporary towers.

E. The Contractor's chosen construction method, sequence, and schedule shall be reflected in the Casting Manual and Erection Manual as specified elsewhere in these special provisions.

10-1.29 FURNISH PRECAST CONCRETE SEGMENT

Furnish precast concrete segment shall conform to the details shown on the plans, the provisions in "Concrete Structures" and "Precast Concrete Quality Control" elsewhere in these special provisions, and these special provisions.

Attention is directed to "Lightweight Concrete," elsewhere in these special provisions regarding requirements for precast lightweight concrete panels that are set into the forms for precast concrete segments.

Attention is directed to "Construction Surveying," elsewhere in these special provisions. Geometry control for furnishing precast concrete segments shall conform to "Construction Surveying," except that the portion of the Survey Plan for geometry control for furnish precast concrete segments shall be incorporated into the Casting Manual as specified herein.

GENERAL

This work shall consist of performing all operations necessary to construct precast concrete segments including manufacturing, storage, and transportation of the segments to the bridge site. The segments shall be furnished complete including all concrete, transverse prestressing steel, bar reinforcing steel, miscellaneous metal, utility ducts, prestressing steel ducts, anchorages, and other appurtenances in connection therewith.

Precast concrete segment age is measured from the date a segment casting is complete. Prior to release for erection, furnished precast concrete segments shall be stored in the Contractor's casting yard or storage facility until the segments are of the age as shown in the following table:

Frame No.	Segment Age
W1, E1	2 months
W2, E2	6 months
W3, E3	6 months
W4, E4	2 months

WORKING DRAWINGS

The Contractor shall submit working drawings in conformance with "Working Drawings," elsewhere in these special provisions. Working drawings shall include complete details, information, and substantiating calculations for the methods, materials, equipment, and procedures the Contractor proposes to use in constructing, handling, storing, and transporting the precast concrete segments.

Working drawing submittals shall include the following:

A. Segment formwork and falsework plans including support for precast panels during casting of the segment;
B. Casting cell foundation plans;
C. Form drawings;
D. Layout of the casting yard showing operational features, casting cells, rebar fabrication and material storage areas, moveable rain and sun sheds, geometry control stations, segment handling and storage facilities and the like;
E. All other supplementary plans and similar data required to successfully accomplish the work;
F. Substantiating calculations for the design of falsework, casting equipment, and formwork including the number of uses prior to replacement;
G. Substantiating calculations for other temporary construction which may be required and which will be subject to calculated stresses;
H. Fully and accurately dimensioned views showing the geometry of each segment including all projections, recesses, notches, openings, blockouts, and other pertinent details;
I. Details and dimensions of the anchorage system for the post-tensioning system;
J. Details of nonprestressed steel reinforcing that include size, spacing, and location including any special reinforcing steel required but not shown on the plans;
K. Details of size and type of ducts for all post-tensioning tendons and their horizontal and vertical profiles including the duct support locations, grout tubes, vents and other relevant details;
L. Details and locations of all other items to be embedded in the segments such as inserts, lifting devices, and post-tensioning hardware components. All Contractor added inserts shall be identified for use;

M. Composite placing drawings to scale and in sufficient detail to show the relative positions of all items that are to be embedded in the concrete and their embedment depth. Such embedded items include the prestressing ducts, vents, anchorage reinforcement and hardware, reinforcing steel, anchor bolts, earthquake restrainers, deck joint seal assemblies, drainage systems, utility conduits. Drawings shall show enough details to ensure that there will be no conflict between the planned positions of any embedded items, and that the concrete cover will be adequate.
N. Details of handling and storing segments;
O. Segment shipping and handling plans;
P. A schedule of the timing and sequence of segment casting and erection including the sequence for making cast-in-place closures and continuity between spans;
Q. Details of any localized strengthening necessary for inserts or lifting holes and the materials and methods to fill and finish such holes; and
R. Details of any localized strengthening for concentrated supports, loads or reactions from any erection equipment.

A supplement to the working drawings shall include the following:

A. The Contractor's proposed methods of geometry controls for the casting operation and a quality control plan for geometry control. This submittal shall be in the form of a "Casting Manual" and shall include the following:

    1. A detailed exposition of the geometry control theory for casting;
    2. A detailed narrative of the step-by-step geometry control procedure;
    3. Detailed calculation forms, and a set of sample calculations for geometry controls, including sample input and output of computer programs;
    4. Identifications of all measuring equipment, procedures, and the location of control points to be established on each segment;
    5. The location and values of all permanent bench marks and reference points in the precasting yard;
    6. Qualifications of personnel who will carry out geometry control;
    7. A geometry control procedure for the vertical and horizontal alignment control of the precasting segments; including survey control and procedures, observations, checks, computational and graphical methods and correction techniques;
    8. The casting curves which include the theoretical geometric horizontal alignment, profile grade and superelevation appropriately combined with camber;
    9. A production schedule with rates of production and number of casting units;
    10. The provisions to protect instruments from construction activities and to minimize the effects of wind and temperature variations on the accuracy of readings; and
    11. The casting manual shall cover all geometry control operations necessary. It shall be coordinated with the erection manual and shall be compatible with the chosen methods of casting and erection, including erection survey, elevation and alignment control.

B. Calculations of creep, shrinkage, and concrete modulus of elasticity in accordance with the recommendations of CEB-FIP Model Code 1978 for Concrete Structures. These calculations shall be adjusted to reflect the results of the materials tests required for structural concrete specified elsewhere in these special provisions.
C. Camber diagrams, casting curves and erection elevations prepared in accordance with the chosen construction method, sequence and schedule and actual material properties. In this respect, the construction methods, sequence and schedule include, but are not limited to, Contractor adopted general construction techniques, the erection equipment, its deployment and effect upon the structure, the introduction or removal of temporary supports, temporary towers, falsework closure devices and the like, their deployment and effect on the structure, the order (sequence) in which all casting, construction methods and step by step erection operations are executed, including post-tensioning, and the timing (schedule) of all such operations, with respect to the maturity of concrete and affect thereon. The casting curve shall be sufficient accuracy to allow the determination of control point settings for accurately casting the segments. The preparation of casting curve shall recognize all deviations from a straight line and shall include all deviations associated with the required alignment and deformations due to dead loads, future superimposed dead loads, erection loads, post-tensioning forces, secondary moments, time dependent effects of prestress losses, creep and shrinkage of concrete at day 4,000.

D. Supporting calculations for any modifications to reinforcement at anchorages made necessary for accommodating the elected post-tensioning system hardware.
E. Supporting calculations for lifting and storing the segments.
F. Supporting calculations for localized strengthening for concentrated supports, loads or reactions from any erection equipment.
G. Method of mixing and placing grout in accordance with the current schedule; equipment description and capacity (including standby flushing equipment); and mix design.
H. The volume of concrete, the weight of reinforcement and the weight of post-tensioning in each precast segment and the totals of these for both the superstructure and substructure summarized and tabulated on shop drawings.
I. Methods of vibration during the concrete placement, including complete placing plan, the number of lifts, lift height, crew size, number of vibrator or vibration devices, and coordination of vibration and cure.
J. Type of cure and schedule for cure.
K. Schedule of form removal.

After a complete submittal has been received (as determined by the Engineer), the Contractor shall allow the Engineer 50 working days to review the complete submittal.

MATERIALS

Prestressing steel, ducts, anchorages, and grout shall conform to the provisions in "Prestressing Concrete" of these special provisions.

Lightweight concrete shall conform to the provisions in "Lightweight Concrete" of these special provisions.

Reinforcement shall conform to the provisions in "Reinforcement" of these special provisions.

Miscellaneous metal shall conform to the provisions in "Miscellaneous Metal (Bridge)" of these special provisions.

TOLERANCES

Finished segment tolerances shall conform to Table 9-1 of Division II – Construction Specifications of the AASHTO *Guide Specifications for Design and Construction of Segmental Concrete Bridges, Second Edition, 1999* and as specified herein. Tolerance for overall depth of segment shall be ±6mm.

Dimensions from segment to segment shall be adjusted to compensate for any deviations within a single segment so that the overall alignment of the completed structure will conform to the dimensions shown on the plans and approved working drawings with supplement.

Overall cumulative tolerances shall conform to the erection tolerances specified elsewhere in these special provisions.

HANDLING, STORAGE, AND SHIPMENT

Care shall be exercised in the handling of segments to prevent damage to them. Handling shall be done only by using devices intended for this purpose as shown on the approved working drawings and supplement. Segments shall not be lifted until a minimum compressive strength of 45 MPa is reached. Segments shall be stored with the deck level in the upright position for superstructure segments. Segments shall be firmly supported on a bearing system under the webs at calculated safe locations as shown on the approved working drawings and supplement. The number of support locations shall be three for each segment during handling, storage, and shipment. The bearing system shall be designed to prevent twist or warping of the segments during the entire period of storage, transportation, and handling. The segments shall not be stacked vertically.

The Contractor shall inform the Engineer in writing at least 10 working days prior to shipment of each segment to allow for inspection. No segment shall be shipped without the Engineer's inspection and approval. Repairs to minor spalls or chipped areas on the match cast joint surfaces shall be made in the match cast position. The Contractor shall record all repairs on the drawings and shall submit all repair records and drawings to the Engineer no more than 2 working days after the repairs are complete. The faces of all match cast joints shall be thoroughly cleaned of laitance, bond breaking compound, and other foreign material by wire brushing or light sand blasting. Upon arrival at the bridge site, each segment shall again be inspected. If any damage has occurred during shipment that could impair the structural or other function of the segment, such damage shall be cause for rejection of the segment.

SEQUENCING AND SCHEDULING

The Contractor's CPM schedule shall contain at least the following activities for the production of precast segments:

A. Working drawing review;
B. Form fabrication;
C. Set up of precasting yard;
D. Form assembly;
E. Segment casting and curing period for each segment;
F. Stressing of transverse prestressing tendons and vertical prestressing bars for each segment;
G. Grouting of tendon and bar ducts for each segment; and
H. Shipment schedule for each segment

The following milestone dates shall be noted on the schedule:

A. Set up staging area;
B. Set up casting yard;
C. Deliver forms;
D. Forms operational;
E. Deliver batch plant;
F. Batch plant operational;
G. Initial working drawing submissions (all major items);
H. Start segment casting; and
I. Finish segment casting

The Contractor's CPM schedule shall include monthly inventory of precast segments in the storage yard and shall be submitted to the Engineer monthly. Changes to projected inventory shall be included in the monthly updates.

Camber diagrams, casting curves, and erection elevations are dependent on the erection sequence and the erection schedule. When modifications are made to the erection sequence or the erection schedule, the Contractor shall submit to the Engineer revised camber diagrams, casting curves and erection elevations with revised erection sequence and the erection schedule.

CASTING REQUIREMENTS

The segments shall be match-cast so that a segment is cast against the preceding segment to produce a matching interface that will permit re-establishment of the cast geometry at the time of erection. Each segment shall be given a distinct erection mark indicating its location and order in the erection sequence. This mark shall be placed on each segment before it is removed from the casting cell. Abutting edges of adjacent segments shall be match marked. Erection marks shall be shown on the erection plans as specified elsewhere in these special provisions.

Before any segment concrete placement, the Contractor shall erect the lightweight concrete panels to the positions as shown on the plans. The erection of the lightweight concrete panels shall be incorporated into the Contractor's falsework and formwork plans in order to successfully construct the concrete segments.

Where sections of forms are to be joined, maximum offset shall be 1.5 mm for flat surfaces and 3 mm for corners and bends.

Tolerances for casting of the precast segments are specified elsewhere in these special provisions. If the Contractor fails to meet these tolerances, the Contractor shall grind the surfaces (if cover is sufficient after grinding) to meet the tolerance or replace the segments. All correction work including the replacement of segments if necessary shall be at the Contractor's expense.

Dimensions from segment to segment shall compensate for deviations within a single segment so that the overall dimensions of the completed structure will conform to the dimensions shown on the plans.

Creep, shrinkage, and concrete modulus of elasticity shall be computed in accordance with the recommendations of CEB-FIP Model Code 1978 for Concrete Structures (Comité Euro-international du Béton Fédération Internationale de la Précontrainte) as adjusted to reflect the results of materials test required for structural concrete specified elsewhere in these special provisions.

All material to be encased within the concrete segment shall be placed and supported in the position as shown on the plans and approved working drawings. Provisions for all projections, recesses, notches, openings, blockouts, and the like shall be made in accordance with the plans and shown on the approved working drawings with supplement. The match-cast segment shall not be twisted. The abutting surface of the bulkhead segment shall be covered with a thin film of a bond breaker consisting of flax soap and talc, or other suitable material as approved by the Engineer. The soap and talc mixture shall be 5 parts flax soap and 1 part talc. The acceptability of a material other than soap and talc shall be determined prior to casting of the segments by demonstration of a large specimen that has a facial area of at least 1.2 meter by 1.2 meter.

Immediately before and after segment casting (before bond breaking), the geometry of the segment shall be recorded from the approved control points. Instruments used for the horizontal and vertical geometry control shall be mounted on rigid permanent platforms with sufficient height to sight on all control points. A minimum of two permanent benchmarks shall be established on line with the instrument mounting pad in the casting yard. Prior to beginning casting operations using the short line method, horizontal and vertical control points shall be established on the fixed bulkhead. The alignment, elevations, and shape of the fixed bulkhead shall be checked by readings on these control points each time the geometry of adjoining segments is checked. If any settlements or distortions beyond tolerance occur, casting with these forms shall be discontinued until the distortion is corrected.

Immediately after casting of a segment is completed, the length of the segment along the line of each web shall be measured and recorded and references for horizontal and vertical control shall be established as follows:

A. Horizontal control shall include a wire stirrup on the horizontal control line at both ends of the segment. A line not more than 0.3 mm in width shall be scribed or a punchmark placed in a permanent manner into each stirrup. Wire stirrups shall be stainless steel.
B. Vertical control shall include a flat head bolt, with a pin hole in the head, approximately flush with the surface of the concrete over each web at both ends of the segment. Bolts shall be stainless steel.

During casting operations, the Contractor shall produce and maintain on a daily basis a graphical plot of the vertical and horizontal “as cast” alignments along each vertical and horizontal control line to an exaggerated scale in order to clearly highlight variations. These shall be depicted against both the theoretical geometric vertical and horizontal alignment casting curves on a continuous layout of an entire unit of the bridge between expansion joints. The Contractor shall maintain this plot in a good condition so that it may be used and referenced during erection.

The following additional requirements shall apply to geometry control for short line casting of segments.

A. The instruments used to measure elevations shall be precision levels equipped with parallel plate micrometers capable of obtaining first order control and one piece Invar rods with centering point bases.
B. The instruments used to make horizontal measurements shall be one-second theodolites.
C. A centerline offset measuring tool shall be directly calibrated in intervals of 0.6 mm and offset measurements shall be observed in an accuracy of 0.3 mm.
D. The set-up position of two adjacent segments before casting shall be independently determined by the Contractor and the Engineer. Casting shall not begin until these surveys agree within the following tolerances:

    1. Elevation: 0.6 mm on any control point
    2. Horizontal: 0.6 mm on a segment centerline offset
    3. Twist error: 0.9 mm

E. After cast observations shall be independently determined by the Contractor and the Engineer. They shall be checked until the independent observations agree within the following tolerances:

    1. Elevation: 0.3 mm on any control point
    2. Horizontal: 0.3 mm on a segment centerline offset
    3. Twist error on elevation control points: 0.3 mm (with 0.6 mm maximum on a random error)

F. Within 5 working days of casting all data from the geometry control, including theoretical and actual reading prior to and following casting the segment (but prior to form release) shall be submitted to the Engineer.

The concrete finish shall be Class 1 Surface Finish as specified in the section 51-1.18B, “Class 1 Surface Finish” of the Standard Specifications. The Contractor shall cast a test panel for use as a standard of finish. Minimum dimensions for the test panel are 2.0m by 2.0m.

When work is in progress, the Engineer shall be provided continuous access to the monitoring instruments, control devices, and casting operations. The Contractor shall submit all recorded data to the Engineer in a timely manner as requested by the Engineer.

EMBEDDED ITEMS

No reinforcing steel or other embedded items shall be cut and removed for installation and alignment of stressing ducts. Any bar that cannot be fabricated to clear the conduits shall be replaced by equivalent area of steel using bars with equal or smaller diameter. Modified working drawings shall be submitted to the Engineer for approval in accordance with the provisions in "Working Drawings," elsewhere in these special provisions. In the plane of the steel parallel to the nearest surface of concrete, bars shall not vary from plan placement by more than 50 mm. In the plane of the steel perpendicular to the nearest surface of concrete, cover to the bars shall not be reduced from plan placement by more than 10 mm unless approved by the Engineer.

Metal ducts shall be supported at intervals of not more than 1.2 meters. At the segment joints, ducts shall be connected by rigid mandrels. Ducts shall not be displaced during casting. The tolerance on the location of the tendons shall be 10 mm at any point and in any direction except that the tolerance shall be 3 mm at the segment ends. The Contractor shall provide additional supports at segment joints to maintain segment alignment at bulkhead.

After installation in the forms, the ends of the ducts shall at all times be sealed to prevent entry of water and debris. Ducts shall be tied in position, inspected, and repaired prior to placing of the concrete. Following concrete placement and prior to shipment and erection, the Contractor shall demonstrate to the Engineer that all empty ducts are free of mortar and water, and are unobstructed and undamaged.

CONCRETE PLACEMENT

Concrete shall not be deposited into forms until the entire set-up of the forms, reinforcement, ducts, and anchorages has been inspected and approved by the Engineer.

Concrete shall not be dropped more than 1.2 m, unless confined by closed chutes or pipes. Formwork shall not be considered as chutes.

Concrete shall be placed in horizontal layers not more than 450 mm thick. Each layer shall be placed, compacted, and consolidated before the preceding layer has taken initial set.

Immediately after the work of placing concrete is halted, all accumulations of mortar splashed upon the remaining exposed reinforcement and surfaces of forms shall be removed before the concrete takes its initial set. Water shall not be applied to concrete surfaces for this purpose. The cleaning operations shall not cause breakage of the concrete-steel bond.

The concrete shall be consolidated by means of vibrators together with other equipment necessary to perform the work. Internal vibrators shall have a minimum frequency of 8,000 vibrations per minute and sufficient amplitude to consolidate the concrete effectively. At least 2 stand-by vibrators in working condition shall be provided for emergency use in case of malfunction. The use of external vibrators for consolidating concrete is permitted and shall be required when the concrete is inaccessible for adequate consolidation. When external vibration is used, the forms shall be constructed sufficiently rigid to resist displacement or damage. Placement and vibration of concrete shall be done with care and in such a manner as to avoid displacement of reinforcing, conduits, and other items to be fixed in place.

No construction joints or cold joints shall be permitted within a segment. Any interruption of more than 30 minutes in the continuous placement of concrete in a segment shall be cause for rejection of that segment.

FORM REMOVAL

Weight-supporting forms shall remain in place until the concrete has reached the strength for form removal. For precast segments this strength shall be a minimum of 25 MPa compressive strength as evidenced by test cylinders made by the Contractor and cured in the same manner as the segment. Care shall be exercised in removing the forms to prevent spalling and chipping of the concrete.

DAMAGED OR DEFECTIVE SEGMENTS

Isolated defects are defects or damages that occur randomly and infrequently, as determined by the Engineer.

Recurring defects are defects or damages of the same general type and nature, which continue to be found in the same general location of the segments at an unacceptable frequency, as determined by the Engineer.

All segments cast will be jointly inspected by the Engineer and the Contractor after casting, after moving to storage from the casting machine, and before and after erection. All segment defects shall be identified and categorized during this inspection. The Contractor shall examine the defects and within 5 working days, propose to the Engineer, in writing:

A. The measures that the contractor shall take to prevent recurring defects in future segments; and
B. The method of repair of all defects discovered as a result of the inspection as required herein.

If recurring defects continue following implementation of the Contractor's preventive measures, or as detected at any time during the construction, the Engineer will suspend the operations producing such defective segments.

The Engineer will determine what constitutes damage or defect, whether the damage or defect is isolated or recurring, and will categorize the damage or defects. Three categories of defects are recognized by the Engineer for this purpose:

A. Cosmetic:
   Cosmetic defects or damages are those which do not affect the ability of the segment to resist construction or service loads or reduce the life expectancy of the structure. This category of defect includes a superficial discontinuity such as hairline cracks, small cracks, small spalls or small honeycombed areas, or any defect that does not extend beyond the centerline of any reinforcing steel, or to any elements of the post-tensioning system.
   Cosmetic defects of other types and causes may also be designated by the Engineer.
   Repair of cosmetic defects shall be made in such a manner that the aesthetics and the integrity of the segment surface is restored.
B. Structural:
   This category of defect shall include any defect which will impair the ability of the segment to adequately resist construction or service loads or reduce the life expectancy of the structure. Any defect or damage which extends beyond the centerline of any reinforcing steel or into any element of the post-tensioning system or occurs in the top slab portion of the segment is considered a structural defect.
   Examples of such defects include cracks, large spalls and honeycombed areas, major segregation or breakage of concrete; however, structural defects of other types and causes may be designated by the Engineer.
   The Contractor shall be responsible for construction load analysis, service load analyses and life expectancy determinations.
   Repair of structural defects shall be such that the aesthetics and structural integrity of the segment shall be completely restored to a condition to be expected had the defect or damage not occurred.
C. Rejectable:
   A rejectable defect is any defect or damage, as determined by the Engineer, which will impair the ability of the segment to adequately resist service loads or construction loads, or will reduce the life expectancy of the structure and which cannot be successfully repaired such that the structural integrity is completely restored. Any segment with a rejectable defect will be deemed unacceptable and shall be removed from the work and replaced by the Contractor at no additional cost to the State.
   Damaged or defective segments may also be rejected by the Engineer for the following reasons:

   1. Failure of the Contractor to submit proposed repair procedures;
   2. Failure of the Contractor to execute the repair according to the approved procedure;
   3. Rejection of the proposed repair procedure or repair by the Engineer;
   4. Failure of the Contractor to provide the required certification or demonstration that the repair was successful and that the defect no longer exists, as required below;
   5. Failure of the Contractor to eliminate recurring defects; and
   6. Determination by the Engineer that the work or materials used in the work does not meet other requirements of the Contract Documents and is not acceptable.

Cosmetic repairs shall only be made following procedures prepared by the Contractor, submitted in writing to and approved by the Engineer. The Contractor's repair procedure shall identify those areas required to be repaired prior to post-tensioning, and those that must be repaired after post-tensioning. The Contractor shall allow the Engineer 5 working days to review and approve for each and any subsequent cosmetic repair procedure.

Structural repairs shall be made following procedures prepared by the Contractor. The repair procedures shall be signed and sealed by the Contractor's Engineer who is registered as a Civil Engineer in the State of California. The Contractor shall submit the repair procedures, in writing, to the Engineer for approval. The Contractor shall allow the Engineer 15 working days to review and approve for each and any subsequent structural repair procedure. The repair procedures shall include the following:

A. A detailed description and sketch of the defect;
B. The magnitude and type of the most critical construction loading and service life condition to which the defective area will be subjected;
C. Detailed reinforcement requirements, material types, surface treatments, curing methods and general repair procedures proposed. The procedure shall clearly indicate those areas required to be repaired before erection, and those areas to be repaired after erection; and
D. The specific nondestructive testing method and procedure by which the Contractor shall demonstrate to the Engineer that the defect no longer exists and the segment has been restored to a condition to be expected had the defect or damage not occurred.

Repairs to the shear keys along the webs shall be made after the segments have been erected. When 20 percent or more of the shear keys in a web have been damaged such that they cannot effectively transfer the shear across the joint, as determined by the Engineer, then the damaged shear keys shall be repaired after the segments have been erected and initially stressed together with no more than 10 percent of the final prestressing force applied across the joint. After the repair has been completed and obtained a minimum compressive strength of 17.5 MPa, the final prestressing force may be applied across the joint.

No repairs shall be made until the repair procedure has been approved by the Engineer. No extension of time will be made for the submittal, review and construction of repairs. No compensation will be made for any costs incurred or for delay in completing the work resulting from repairing damaged or defective segments.

DEMONSTRATION SEGMENT POURS

The Contractor shall cast at least one full scale demonstration segment at the precast concrete plant to demonstrate that the segments can be cast with the proposed mix. The first demonstration segment shall be Segment 1W at Pier 16 Eastbound. Design materials and procedures used in the demonstration segment shall be identical to those proposed to be used in production. The demonstration segment shall be constructed after creep and shrinkage tests for the proposed mix are complete. The demonstration segment shall be made sufficiently before production segments are cast to demonstrate that design compressive strength can be achieved and that segments can be cast without segregation of the concrete. The cylinders shall be cured and tested in the same manner as acceptance cylinders in a production mode. Test results for ball penetration, freshly mixed concrete unit weight, and compressive strengths at concrete ages of 1, 3, 7, 28, 56 and 90 days shall be submitted within 3 working days for each test. Failure to meet any of the acceptance criteria will result in the rejection of the demonstration segment. If the demonstration segment is rejected by the Engineer, the Contractor shall cast additional demonstration segments until all acceptance criteria are met. Final mix design approval will not be given until the design concrete compressive strength has been achieved from a successful demonstration segment. The successful demonstration segment may be used in production.

MEASUREMENT AND PAYMENT

Furnish precast concrete segment will be measured by cubic meter in accordance with the dimensions shown on the plans.

No payment will be made for precast concrete segments that fail to meet any of the acceptance criteria.

No compensation will be made for additional concrete, reinforcement, and any other costs incurred or for delay in completing the work resulting from replacing rejected segments.

The contract price paid per cubic meter for furnish precast concrete segment shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, including reinforcing and prestressing steel as required, and for doing all work involved in constructing, furnishing, storing, and transporting precast concrete segment to the site of the work complete and ready for erection, furnishing the casting manual, and providing the surveying for geometry control, as shown on the plans, as specified in the Standard Specifications and these provisions, and as directed by the Engineer.

Furnishing lightweight concrete panels will be measured and paid for as specified in "Lightweight Concrete," elsewhere in these special provisions.

Erect lightweight concrete panels will be measured and paid for as specified in "Erect Precast Concrete Segment," elsewhere in these special provisions.

10-1.30 ERECT PRECAST CONCRETE SEGMENT

Erect precast concrete segment shall conform to the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications, and these special provisions.

Prestressing steel, ducts, anchorages, and grout shall conform to the provisions in "Prestressing Concrete" of these special provisions.

Attention is directed to "Construction Surveying," elsewhere in these special provisions. Geometry control for erecting precast concrete segments shall conform to "Construction Surveying," except that the portion of the Survey Plan for geometry control for erect precast concrete segments shall be incorporated into the Erection Manual as specified herein.

GENERAL

This work shall consist of furnishing all labor, equipment, and materials and performing all work involved in erecting precast concrete segments, including all erection equipment, and temporary prestressing steel for erection as shown on the plans and approved working drawings and supplement.

Construction stresses shall not exceed allowable stresses shown in Table 7-2, "Allowable Tensile Stresses for Construction Load Combinations" of the AASHTO Guide Specifications for Segmental concrete Bridges, 2nd Edition, 1999.

WORKING DRAWINGS

The Contractor shall submit working drawings in conformance with the provisions in "Working Drawings," elsewhere in these special provisions. Working drawings shall include complete details, information, drawings, and substantiating calculations of the methods, materials, equipment, and procedures that the Contractor proposes to use in erecting the segments.

Working drawing submittals shall include the following:

A. Erection sequences and plans including the incorporation of hinge erection and deck pour connection construction between the adjacent segments.
B. Temporary and permanent prestressing sequences.
C. Erection equipment details, including mass of equipment and attachment of equipment to the structure.
D. Diagrams showing support locations on the structure for equipment for each construction stage, including all interfacing of equipment with permanent structure.

A supplement to the working drawings shall include the following:

A. The Contractor's proposed methods of geometry controls for the erection operation. This submittal shall be in the form of an "Erection Manual" and shall include the following:

    1. A detailed exposition of the geometry control theory for erection.
    2. A detailed narrative of the step-by-step geometry control procedure during erection.
    3. A step-by-step segment erection procedure with all erection operations including, but not limited to, the following:

        a. A detailed step-by-step sequence for the erection of each segment including all intermediate procedures relating to erection equipment, temporary and permanent post-tensioning.
        b. Erection equipment support details including locations of supports and the design loading at each support.
        c. Positioning, use and sequencing of falsework, jacking, releasing of falsework, temporary towers, closure devices and the like.
        e. Positioning, use and sequencing of erection equipment such as cranes, beam and winch devices, gantries, trusses and the like, including the movement, introduction and removal of any supports onto or connections with the structure.
        f. Detailed scheduling of all temporary and permanent post-tensioning operations and sequences in accordance with the segment erection and closure operations.

g. Stressing forces and elongations for post-tensioning.
h. A method of field survey control for establishing and checking the erected geometry (elevations and alignments), with particular attention to the setting of critical segments such as the first segments adjacent to the pier segment.
i. Detailed, step-by-step, sequence of closure operations; between the pier table and adjacent segments, between adjacent precast segments at the deck and between adjacent cantilevers including any partial stressing across the closure during concrete curing.
j. Detailed, step-by-step, sequence of jacking operations at the closure in the interior span of a bridge frame as specified in "Jack Superstructure" elsewhere in these special provisions.
k. Any other relevant operations as required and applicable to the construction method employed by the Contractor.

4. Detailed, step-by-step, sequence of hinge erection at hinges BW, BE, CW, CE, DW, and DE.
5. Detailed, step-by-step, sequence of hinge erection at hinges AW and AE, the interface with the Self-Anchored Suspension Bridge.
6. Detailed, step-by-step, sequence of hinge erection at hinge EW and EE, the interface with Oakland Approach Structures.
7. Measuring equipment, procedures, locations of control points established on each segment during the casting operation, and qualifications of personnel who will carry out geometry control.
8. Detailed calculation forms and a set of sample calculations for geometry control.
9. A table of elevations and alignments required at each stage of erection at the control points established for casting controls. Stages for which theoretical positions of control points are to be computed shall include the segment in place prior to applying post-tensioning and the segment with post-tensioning applied.
10. Calculations of control point elevations and alignment for each stage of erection taking into account the final deck elevations as shown on the plans, the as-cast profile, and the calculated deflection for each stage of erection.
11. An erection schedule with rates of production and number of erection units.
12. All geometry control operations necessary for erection and in agreement with the Contractor's chosen methods of erection including erection survey, elevations, and alignment control.
13. The erection manual shall be coordinated with the casting manual utilizing the same control points established on each segment during the casting operation.

B. Method of mixing and placing grout in accordance with the proposed schedule; equipment description and capacity (including standby flushing equipment); and mix design.
C. Independently checked calculations for erection equipment and temporary construction loading for each erection stage including:

1. Equipment loads;
2. Erection loads;
3. Temporary construction supports and loading conditions;
4. Stresses induced during temporary construction conditions;
5. Stresses induced during erection; and
6. Stresses from equipment connections to the structure.

D. Substantiating documents for experienced and qualified personnel with at least 2 years experience in concrete segmental box girder construction who shall operate the instrument and supervise the entire erection operation.
E. Certified test reports of epoxy workability, gel time, contact time, compressive and shear strengths, and working temperature range tests specified elsewhere in these special provisions.
F. Epoxy application plan in conformance with requirements in section, "Epoxy Bonding Material for Precast Segments," elsewhere in these special provisions.
G. All other supplementary plans, procedures, materials, and similar data required to successfully erect the segments.

H. The Contractor's proposed load testing programs for erection equipment, including special equipment for cantilever erection.
I. Erection Safety Plan detailing procedures for safe lifting operation. This document shall name the person or persons in responsible charge of lifting operations and shall include their qualifications and experience.
J. If the Contractor proposes to deviate from the previously approved erection manual, the Contractor shall submit a revised erection manual to the Engineer for approval. The Contractor shall allow the Engineer an additional 60 working days to review the submittal.

After complete working drawings and supplement are received by the Engineer, the Contractor shall allow the Engineer 60 working days to review the submittal.

TOLERANCES

The erection tolerances shall be as follows:

A. Maximum differential offset between outside faces of adjacent segments in the erected position, including the roadway deck, shall not exceed 6 mm.
B. Transversely, the completed segmental span shall not deviate from the theoretical cross slope of the roadway by more than 0.001 radians, measured curb-to-curb, at any point along the span.
C. Longitudinally, the angular deviation from the theoretical slope change between two successive segments shall not exceed 0.0030 radians.
D. Dimensions from segment to segment shall be adjusted so as to compensate for any deviations within a single segment so that the overall dimensions of the completed structure will conform to the dimensions shown on the plans such that the accumulated maximum error should not exceed 1/1000 of the span length for either vertical profile and/or horizontal alignment. Deviations exceeding the erection tolerances listed above which are discovered during the match-casting operation shall be identified by after-cast surveys at the casting site before the matched-castings are separated. Corrections for these deviations shall be submitted to the Engineer prior to casting the next match-cast segment.

The erection of precast segments by cantilever method shall conform to these special provisions and the following special requirements:

A. During erection by the cantilever method, the maximum loads as shown on the plans and approved working drawings and supplement shall not be exceeded.
B. The horizontal and vertical location of the control points for the first typical segments adjacent to the pier table shall be within 6 mm of the position required by the approved erection plans and the slopes across these segments shall not exceed 0.001 radians of angular deviation from the theoretical values for horizontal and vertical grades.
C. The alignment and elevations of the cantilevers shall be checked by the Contractor and the Engineer, independently and concurrently within one hour of sunrise on each day that segments are to be erected. The measurements made by the Engineer and the Contractor shall agree to within 6 mm and be within the allowable tolerance from the theoretical values as specified elsewhere in these special provisions. If the measurements between the Engineer and the Contractor do not agree within 6 mm or the measurements are not within the allowable tolerance, the erection operation shall be temporarily suspended until the discrepancies are resolved.
D. The survey for geometry control shall be supervised by an engineer who is registered as a Land Surveyor or as a Professional Engineer in the United States.
E. To guard against false reading due to temperature differentials, readings shall only be taken when all portions of the box section are stabilized at the same temperature. The Contractor shall use precautions in devising methods to guard against these possible false readings and corresponding adjustments due to temperature differentials.

F. If measured elevations deviate out of tolerance from the table of elevations, the Engineer will suspend further erection of superstructure segments and the deviated out-of-tolerance segments will be rejected. The Contractor shall submit to the Engineer for approval a mitigation plan for restoration or replacement for each rejected segment, and this plan shall conform to the provisions in "Working Drawings," elsewhere in these special provisions. Prior to submitting this mitigation plan, the Engineer will hold a restoration feasibility meeting with the Contractor to discuss the feasibility of restoring rejected segment to its designed elevation and alignment. The Engineer will consider the magnitude and the location of the deviations, and the design information for the segment. This information will be made available to the Contractor, if appropriate, for the development of the mitigation plan. If the Engineer determines that it is not feasible to restore the rejected segment, the Contractor shall not include restoration as a means of mitigation and shall proceed with the submittal of a mitigation plan for replacement of the rejected segment. No additional payment or extension of time shall be due to the Contractor as a result of this suspension for unacceptable erection deviation.

After erection, final post-tensioning, final corrections and adjustments are complete, superstructure shall conform to the grade and alignment shown on the plans and approved working drawings and supplement.

The closure joint forms shall provide tolerances as specified for erection for mid-span closure joints.

EQUIPMENT

Erection equipment and other temporary construction shall conform to the following requirements:

A. Prior to use of any equipment such as a launching gantry, hoist, crane, a beam and winch, or other lifting device specifically fabricated for the purpose of lifting precast segments, the Contractor shall demonstrate by a full scale load test that the equipment is capable of supporting a load equal to 125 percent of the weight of the heaviest segments to be lifted. The Contractor shall submit to the Engineer for review the proposed load testing program with written approval from the equipment designer. The Contractor shall notify the Engineer in writing at least 5 working days prior to commencing any load test to allow witnessing of the load test. The equipment shall not be installed on the bridge until the load testing has been successfully completed.
B. Observation of load testing of erection trusses or erection equipment or review and approval of design drawings and calculations covering erection trusses or erection equipment by the Engineer shall in no way relieve the Contractor of any responsibility under the contract for the successful erection of segments in conformity with the requirements of the plans and specifications.

SEQUENCING AND SCHEDULING

The Contractor's CPM schedule shall contain at least the following activities for precast segment erection:

A. Pier table construction;
B. Erection equipment fabrication;
C. Erection equipment assembly;
D. Segment erection;
E. Stressing of cantilever tendons;
F. Grouting of cantilever tendons;
G. Superstructure jacking operation;
H. Hinge erection;
I. Closure pour construction;
J. Stressing of continuity tendons;
K. Stressing of span tendons;
L. Grouting of continuity tendons and span tendons; and
M. Release of closure falsework.

The following milestone dates shall be noted on the schedule:

A. Submittal of working drawings and supplement to the Engineer;
B. Deliver erection equipment;
C. Start each pier table construction;
D. Start and end of each segment erection;
E. Start grouting for each segment;
F. Completion of each cantilever construction;
G. Start closure of each cantilever;
H. Start stressing of continuity tendons and span tendons;
I. Start superstructure jacking for each frame;
J. Completion of each frame construction; and
K. Start hinge erection for each hinge location.

The casting curves and erection elevations are dependent upon the erection sequence and Contractor's schedule. Therefore, the Contractor shall produce and submit revised erection elevations and casting curves upon a change of erection sequence or schedule. The submittal of revisions shall conform to the provisions in "Working Drawings," elsewhere in these special provisions. The Contractor shall allow the Engineer 20 working days to review the revised erection elevations and casting curves.

APPLICATION OF EPOXY BONDING AGENT

Epoxy bonding material shall conform to the requirements in Section "Epoxy Bonding Material for Precast Segments" elsewhere in these special provisions.

Before applying epoxy, the interfaces shall be clean and free from laitance and bond breaking material. Oil, diesel residue, and other materials that may affect bond shall be removed. The surfaces shall have no free moisture on them. Free moisture shall be considered to be present if a rag wiped over the surface gathers any dampness.

The Contractor shall shade the interfaces from direct sunlight, rain, and run-off water for at least one hour before the epoxy resin is applied and until after the designated prestress load has been applied.

Application of epoxy shall begin immediately after a batch has been mixed. Applications shall be to a nominal thickness of 1.5 mm on both faces. No epoxy shall be applied after the specified gel time has elapsed. Epoxy shall not be applied within 15 mm of any duct. The Contractor shall ensure that epoxy does not extrude into ducts.

Immediately after one face is covered with epoxy, the unit shall be brought into position and the designated prestress applied. The Contractor's construction scheme shall provide for a minimum contact pressure of 0.28 MPa compression over the entire joint of precast concrete segments while the epoxy is curing in the joint. The Contractor shall plan the erection and post-tensioning operations such that, for the particular formulation of epoxy bonding agent being used, the time elapsing between initial mixing of the components for the first batch of epoxy bonding agent and application of the minimum contact pressure of 0.28 MPa compression shall not exceed 70 percent of the contact time. Prior to beginning erection, the Contractor shall submit to the Engineer for review, details covering how compliance with this 0.28 MPa contact pressure and the time limit will be achieved during erection of segments.

For superstructure segments, the compressive force across a joint (contact pressure) shall be accomplished through temporary or permanent post-tensioning. The specified contact pressure shall be continuously maintained across a joint.

The Contractor shall internally "swab" the ducts at the match cast joint after temporary prestressing to smooth out any extruded epoxy within the duct. When slow-set epoxy is used, the swab shall be passed after each new segment is erected through all the segments adjacent to uncured epoxy. Excess epoxy squeezed from the joint shall be captured and not allowed to free fall from the structure. If specified minimum contact pressure is not attained within the contact time, the segments shall be pulled apart and all the epoxy on both interfaces removed with spatulas and a suitable solvent that will remove all remaining epoxy. No epoxy shall be applied to the joint until 24 hours after the solvent has been used.

The contact time shall be counted starting from initial mixing to application of 0.28 MPa contact pressure unless the manufacturer's instructions direct otherwise. All excess epoxy after jointing shall be cleaned from outer faces in such a way as not to damage or stain the concrete face.

Application of epoxy bonding agent during erection of superstructure segments shall be permitted only when the substrate temperatures of the mating surfaces are between 5°C and 40°C. An artificial environment may be provided to maintain the substrate temperature within the permissible limits by use of an enclosure heated by circulating warm air or by radiant heaters. Localized heating shall be avoided and the heat shall be provided in a manner that prevents surface temperatures greater than 35°C during the epoxy hardening period. Direct flame heating of concrete shall not be permitted.

The Contractor shall keep a record of each joint with the following details:

A. Span number and joint number for superstructure construction;
B. Time of mixing first batch of epoxy bonding agent applied to the joint;
C. Date and time of jointing;
D. Time of applying specified contact pressure to the joint;
E. Batch numbers of resin and hardener;
F. Maximum temperature of mix;
G. Weather conditions (temperature and humidity shall be continuously recorded on site); and
H. Submittal number of relevant tests.

Within 3 working days after each segment is erected, the Contractor shall furnish to the Engineer a copy of the joint detail materials and operation records.

In the event that water seepage through the deck slab at an epoxy precast segment joint becomes evident, the Contractor shall take measures to seal the joint such as applying a gravity feed low viscosity concrete crack sealer or epoxy pressure injection. Proposed methods for sealing leaking segment joints shall be submitted to the Engineer for approval prior to the sealing operation. Gravity fed sealers shall not be used after the concrete wearing course has been placed. No additional payment will be made for sealing leaking segment joints.

FINAL CLEAN UP

Before Final Acceptance, the Contractor shall clean the interior of the concrete box girders of all rubbish, excess materials, loose concrete, grout, dirt, and debris. The interior of the box girders shall then be swept out. The final clean up shall be performed after all work on the interior of the box girders, including grouting of all tendons and electric work, and other utilities are installations have been completed.

MEASUREMENT AND PAYMENT

Erect precast concrete segment will be measured by cubic meter as shown on the plans and in the Engineer's Estimate.

The contract price paid per cubic meter for erect precast concrete segment shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in erecting precast concrete segment, at the site of the work including testing equipment, complete in place, as shown on the plans, as specified in the Standard Specifications and these provisions, and as directed by the Engineer.

Full compensation for erection of precast lightweight concrete panels that have been cast into the precast concrete segments shall be considered as included in the contract price paid per cubic meter for erect precast concrete segment and no separate payment will be allowed therefor.

ENGINEER'S ESTIMATE
04-012024

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
61 (S)	048580	MODULAR JOINT SEAL ASSEMBLY (HINGE DE)	M	25		
62 (S-F)	520102	BAR REINFORCING STEEL (BRIDGE)	KG	16 490 000		
63 (S-F)	520110	BAR REINFORCING STEEL (EPOXY COATED) (BRIDGE)	KG	9 110 000		
64 (S-F)	048581	HEADED BAR REINFORCEMENT	EA	140 500		
65 (F)	048582	FURNISH STRUCTURAL STEEL (ORTHOTROPIC BOX GIRDER)	KG	2 600 000		
66 (S-F)	048583	ERECT STRUCTURAL STEEL (ORTHOTROPIC BOX GIRDER)	KG	2 600 000		
67 (F)	048584	FURNISH STRUCTURAL STEEL (BRIDGE FOOTING)	KG	21 600 000		
68 (S-F)	048585	ERECT STRUCTURAL STEEL (BRIDGE FOOTING)	KG	21 600 000		
69 (F)	048586	FURNISH STRUCTURAL STEEL (PIPE BEAM)	KG	1 580 000		
70 (S-F)	048587	ERECT STRUCTURAL STEEL (PIPE BEAM)	KG	1 580 000		
71 (F)	048588	FURNISH STRUCTURAL STEEL (PIPE BEAM FUSE)	EA	20		
72 (F)	048589	FURNISH STRUCTURAL STEEL (BRIDGE BIKEPATH)	KG	3 290 000		
73 (S-F)	048590	ERECT STRUCTURAL STEEL (BRIDGE BIKEPATH)	KG	3 290 000		
74 (S-F)	048591	TRAVELER SUPPORT RAILS	KG	192 000		
75 (S)	048592	TRAVELER SCAFFOLD	LS	LUMP SUM	LUMP SUM	
76 (S)	048593	TRAVELER SCAFFOLD MECHANICAL	LS	LUMP SUM	LUMP SUM	
77	021685	SERVICE PLATFORMS	EA	26		
78	560218	FURNISH SIGN STRUCTURE (TRUSS)	KG	29 000		
79	560219	INSTALL SIGN STRUCTURE (TRUSS)	KG	29 000		
80	562004	METAL (RAIL MOUNTED SIGN)	KG	1900		